Appendix C
Glossary

A

aggradation: The geologic process by which a streambed is raised in elevation by the deposition of additional material transported from upstream (opposite of *degradation*).

alevin: The life stage of salmon and trout immediately following the egg stage. Hatchlings still have their yolk sacs attached to them, and they live within the spaces in the gravel.

allochthonous: Leaf litter.

alluvial fan: A relatively flat to gently sloping landform shaped like an open fan or a segment of a cone, composed predominately of coarse-grained soils. The stream deposits these soils wherever it flows from a narrow mountain valley onto a plain or broad valley, or wherever the stream gradient suddenly decreases.

alluvial stream: Streams that have erodible boundaries and are free to adjust dimensions, shape, pattern and gradient in response to change in slope, sediment supply or discharge.

alluvium: Sedimentary deposits created by streams on river beds, floodplains and as alluvial fans. The term applies to stream deposits of recent time.

anadromous: Fish that are born in freshwater, migrate to and live a portion of their lives in saltwater, then return to freshwater to reproduce.

anastomosing channel: A channel that is divided into several smaller channels, which successively meet and then redivide. Synonymous with *braided channel*.

anchor point: Either natural (e.g., tree or rock outcroppings) or man-made hard structures (e.g., rock or log trenches) at the upstream and/or downstream end of an isolated scour hole.

avulsion: A significant and abrupt change in channel alignment resulting in a new channel across the floodplain. Straightening or relocating the channel by constructing dikes or levees is a common causes of channel avulsions.

B

backwater: Stream water, obstructed by some downstream hydraulic control, that is slowed or stopped from flowing at its normal, open-channel flow condition.

backwater bars: Gravel bars that form upstream due to backwater conditions.

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bank erosion: The process by which water loosens and wears away soil and rock from the edge of a body of water, usually resulting in an enlargement of the body of water and a corresponding reduction in the size of the land.

bank fill: Any material used to construct a streambank. Bank fill is usually composed mostly of mineral content, as opposed to topsoil.

bankfull: The full capacity of the channel clear up to the top of the channel bank on either side (the transition point between the bank and the floodplain).

bankfull discharge: A flow of water large enough to fill the width and depth of a stable, alluvial stream. Water fills the channel up to the first flat depositional surface (active floodplain) in the stream. Such a discharge typically occurs every 1.5 years or so.

barbs: Low-elevation structures projecting from a bank and angled upstream to redirect flow away from a streambank, thereby controlling erosion of the streambank.

baseflow: Flow in a channel generated by moisture in the soil or groundwater.

batter: The receding, upward slope of a wall or the face of a structure. To give a structure or wall a receding, upward slope.

bed: The land below the ordinary high water lines of state waters. This definition does not apply to irrigation ditches, canals, storm-water run-off devices or artificial watercourses, except where they exist in a natural water course that has been altered by man.

bed erosion: The process by which water loosens and wears away soil and rock from the bottom of a body of water, usually resulting in a deepening of the body of water.

bedload: The part of a channel's sediment transport that is not in suspension, consisting of coarse material that is moving on or near the channel bed.

bed roughness: The unevenness of streambed material (i.e., gravel, cobbles) that contributes resistance to stream flow. The degree of roughness is commonly expressed using "Manning's roughness coefficient."

benthic: Of or pertaining to animals and plants living on or within the substrate of a water body.

benthic drift: The downstream movement of bottom-dwelling plants and invertebrates, accomplished by floating in the current.

bioengineering: An engineering technique that applies biological knowledge when designing and constructing earth and water constructions and when dealing with unstable slopes and streambanks.

bole: The trunk or stem of a tree, without rootwad.

braided channel: A river channel having multiple subchannels that meander away from each other and then reunite at intervals.

brush mattress: A mattress-like covering that is placed on top of the soil. The mattress is made of living, woody plant cuttings that are capable of sprouting roots, branches and leaves.

buttress: A lateral restraint against slope movement.

C

channel: A natural or artificial waterway that periodically or continuously contains moving water. It has a distinct bed and banks that confine the water flowing in the channel.

channel bed slope: A channel's vertical change over distance (the gradient).

channel bed width: The width of the bankfull channel. In some channels, there is not a floodplain or a bench present to define bankfull width. In those cases, bankfull width is determined by features that do not depend on a floodplain; features similar to those used in the description of an active channel and ordinary high water.

channel flanking: See *flanking*.

channelization: Straightening a stream or dredging a new channel into which the flow of the original channel is diverted.

channel top width: The horizontal distance along a transect line from top of bank to top of bank, measured at right angles to the direction of flow.

char: Char belong to the Family "Salmonidae" genus "Salvelinus," and are described as having a body with light spots on a darker background, very fine and embedded scales, and the absence of teeth on the shaft of the vomer. Char include bull trout, Dolly Varden, eastern brook trout and lake trout.

chimney drain: Vertical drains that typically feed into a collection drain at their base.

chute cutoff: A new channel formed by the truncating of a meander bend across the floodplain. The channel flow bypasses the meander bend by cutting straight through it.

coffer dam: An impermeable structure placed in a stream channel that allows water on one side of the structure to be pumped out so that construction can occur in dry conditions.

cohesive soil: Soils that have natural resistance to being pulled apart.

coir: Coconut fiber used in a variety of ways to protect streambanks from erosion.

coir logs: Cylindrical objects constructed from coconut fiber (coir) and bound by mesh.

conifer: Any of a large family of evergreen shrubs and trees, characterized by needle-shaped leaves and cones, such as pines, firs, hemlocks and spruces.

cribwall: A structure built of logs laid horizontally and separated by smaller wooden spacers. Cribwalls are sometimes used to protect streambanks from the erosive effects of channel flow.

cross section: The characteristics of an object when viewed crosswise; for streams, a transect taken at right angles to flow direction.

current: The flow of water moving in a downstream direction. See also *velocity*.

D

D_{50}, /D_{100}: The particle size for which 50 and 100 percent of the sample is finer.

debris: Material distributed along and within a channel or its floodplain either by natural processes or human influences. Includes gravel, cobble, rubble and boulder-sized sediments, as well as trees and other organic detritus.

deciduous: Any of a large family of trees and shrubs that shed their leaves each year, such as maple, birch, cottonwood and alder.

degradation: The removal of streambed materials caused by the erosional force of water flow that results in a lowering of the bed elevation throughout the reach (opposite of *aggradation*).

deposition: The settlement of material onto the channel bed.

dessication: To dry up.

dewater: To remove water from an area.

discharge: The rate of flow expressed in volume per unit of time. For example, cubic feet per second. Discharge is the product of the mean velocity and the cross-sectional area of flow.

doloes: A specific form of concrete armor unit in the shape of an "H," commonly used in bank-stabilization applications where rock is unavailable and/or to create porous treatments.

dominant discharge: The discharge responsible for the largest volume of sediment transport over a long period of record. It is typically a one- to three-year event.

drop structure: Any in-channel structure that creates a distinct drop in water-surface elevation in a downstream direction.

drop/weir scour: Scour resulting from an increase in flow velocity through a weir or due to hydraulic forces associated with a drop in water-surface elevation.

E

ecology blocks: Concrete blocks.

effective discharge: Discharges as determined from measured or calculated flow and sediment records.

energy sink: A scour pool formed by flow in the corner of a tight-radius bend that dissipates the energy of the entire momentum of the flow.

engineered log jam: Constructed collections of large woody debris that redirect stream flow.

entrainment: The incidental trapping of fish and other aquatic organisms in waters being diverted for other purposes. Sediment entrainment refers to sediment transported by flows.

erosion: A process or group of processes whereby surface soil and rock is loosened, dissolved or worn away and moved from one place to another by natural processes. Erosion usually involves relatively small amounts of material at a time; but, over a long period of time, it can involve very large volumes of material.

evapotranspiration: The combination of evaporation from the soil surface and transpiration from vegetation.

F

fascine: A long bundle of live cuttings bound together and secured to the streambank or floodplain with live and dead stakes.

flanking: The process by which channel flow occurs behind a channel feature, such as a constructed bank.

floodplain: Any lowland that borders a stream and is inundated periodically by the stream's waters.

floodplain roughness: Any objects on the floodplain that, through friction, reduce flow velocity over the floodplain.

fluvial geomorphology: The science of or pertaining to river processes. Also, the distinctive channel features produced by the action of a stream or river.

forbe: A broad-leafed herb or herbaceous plant other than grass.

freshet: Rapid, temporary rise in stream flow caused by snow melt or rain.

G

geogrid: Sheets manufactured from durable, synthetic fibers used for erosion control.

geomorphic equilibrium: The "sediment-transport continuity" of a stream, wherein the quantity and size of sediment transported into the reach is approximately the same as the quantity and size of sediment transported out of the reach. If a stream is in geomorphic equilibrium, the processes of bank erosion and channel migration will be stable or occur only gradually.

gradient: The slope of a stream-channel bed or water surface, expressed as a percentage of the drop in elevation divided by the distance in which the drop is measured.

groins: Large structures that project into the channel from the bank and extend above the high-flow, water-surface elevation. Their purpose is to dissipate energy and slow the velocity of the flow. Groins differ from barbs in size and function.

H

headcuts or nickpoints: The erosion of the channel bed, progressing in an upstream direction, recognized as small drops or waterfalls or abnormally over-steepened channel segments.

herbaceous cover: A bank-stabilization technique that consists of planted or installed, nonwoody vegetation, such as grass and grass-like wetland plants, rushes, sedges, ferns, legumes, forbes and wildflowers.

holding areas: Areas in a stream that are protected from the current, where salmon can rest while migrating, usually upstream.

hydrograph: A graphic representation of time versus the flow in a channel.

hydrology: The properties, distribution and circulation of water in a stream channel.

hyporheic zone: The zone of saturated sediment adjacent to and underneath the stream. It is directly connected to the stream, and stream water continually exchanges into and out of the hyporheic zone.

I

incised channel: A stream channel that has deepened, becoming disconnected from its floodplain.

incision: The change in channel cross section resulting from the process of degradation.

J

jet scour: Scour resulting as a jet of flow enters the stream (similar to flow ejecting from the nozzle of a hose).

K

key: Structural material (e.g., rock and/or wood) buried into the streambank or into the channel bed to prevent flanking of a bank-protection structure due to erosion in the near-bank region.

L

lithology: The description of rocks or earth materials on the basis of color, composition and grain size.

local scour: Discrete, tight scallops along the bankline or as depressions in the streambed resulting from erosion. It is generated by flow patterns that form around an obstruction in a stream and spill off to either side of the obstruction, forming a horseshoe-shaped scour pattern in the streambed.

log toe: A structure installed at the base of a bank slope constructed of log materials to protect the base of the bank from erosive forces.

M

macroinvertebrates: Invertebrates large enough to be seen with the naked eye.

Manning's roughness coefficient: An equation used to quantify flow in an open channel.

manufactured retention system: Materials made and installed to stabilize channel banks and beds, usually consisting of interlocking or connected units.

mass failure: The sudden breaking away and downward movement of a cohesive portion of the land surface, as opposed to the gradual erosion of soil.

mean annual discharge/mean annual flow: The averaging of the daily mean discharge over a period of years.

mean high flow: The mean of the highest flows over a period of time.

meander: The snake-like appearance of the reach of a stream. More specifically, a stream reach is said to be meandering if its length is 1.5 times (or more) the length of the valley through which it passes. Any reach that exceeds the length of the valley can be taken as evidence of meandering, but 1.5 is the standard minimum used to confirm meandering activity.

meander pattern: A series of sinuous curves or loops in the course of a stream that are produced as a stream swings from one side of its floodplain to the other.

mechanism of failure: The physical process of erosion. Examples of mechanisms of failure include scour and avulsion.

mitigation: Actions taken to avoid or compensate for impacts to habitat resulting from man's activities (WAC 220-110-050).

N

neck cutoff: The loss of a meander resulting from the intersection of meander bends.

O

ordinary high water mark: Generally, the lowest point at which perennial vegetation grows on the streambank. Legal definitions of the ordinary high water mark describe erosion and sediment characteristics as well.

The ordinary high water mark can usually be identified by physical scarring along the bank or shore, or by other distinctive signs. This scarring is the mark along the bank where the action of water is so common as to leave a natural line impressed on the bank. That line may be indicated by erosion, shelving, changes in soil characteristics, destruction of terrestrial vegetation, the presence of litter or debris or other distinctive physical characteristics.

The legal definition of ordinary high water mark per WAC 220-110-020(31) is:

> "Ordinary high water line means the mark on the shores of all waters that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual and so long continued in ordinary years, as to mark upon the soil or vegetation a character distinct from that of the abutting upland: Provided, That in any area where the ordinary high water line cannot be found the ordinary high water line adjoining saltwater shall be the line of mean higher high water and the ordinary high water line adjoining freshwater shall be the elevation of the mean annual flood."

Considerable judgment is required to identify representative ordinary high water marks. It may be difficult to identify the mark on cut banks. In warm months, grasses or hanging vegetation may obscure the mark. Artificial structures (culverts, bridges or other constrictions) can affect the mark in their vicinity by creating marks on the shore that are consistent with ordinary high water marks, but they are above the elevation that is usually found in undisturbed river reaches.

Where the ordinary high water mark cannot be determined reliably, the surveyor should move to a location where the channel section will allow for a more precise measurement. At a location beyond the influence of artificial structures, measure the indicators at five different places (spaced about five channel widths apart straight channel sections), and take the average of these distances.

oversteepened bank: A streambank that has been steepened beyond the angle of repose or beyond the point to which soil cohesion supports the bank.

P

pelagic: Of or occurring in the open sea; ocean inhabiting.

perched floodplain: A terrace. A floodplain surface that, because the streambed has degraded, becomes high enough above the channel that it is no longer inundated by the current hydrologic regime.

piezometer: An instrument used to measure pressure by examining its effect on a volume of liquid or solid.

planform: The characteristics of a river as viewed from above (in an aerial photo, on a map, etc.), which are generally expressed in terms of pattern, sinuosity (channel length/valley length) and individual meander attributes such as amplitude, wavelength and radius of curvature.

plan view: The view from above.

point bar: A stream depositional feature, usually found on the side opposite the concave bank, that helps move bedload from one meander to the next.

pool: A portion of a stream that is deeper than adjacent areas and has a reduced current velocity during base flow.

porous weir: A low-profile structure consisting of loosely consolidated boulders that span the width of the channel.

profile: A cross-sectional depiction of certain characteristics; with streams, these usually include depth, bed configuration, substrate and velocity.

Q

quiescent zone: A calm zone of water in a stream; opposite of turbulent.

R

reach: a) Any specified length of stream;

b) A relatively homogeneous section of a stream having a repetitious sequence of physical and biological characteristics;

c) A regime of hydraulic units whose overall profile is different from another reach.

rearing: The process by which young fish spend up to two years (depending upon the species) in small streams, back channels and lakes where they feed and grow. Juvenile salmon may rear in different streams than they were born in, including intermittent or seasonally wetted watercourses.

recurrence interval: The frequency at which a certain magnitude of flood occurs. Also called "return period."

redd: A nest in a stream, excavated by spawning fish, where they deposit their eggs. Excavation is accomplished by whipping their tails back and forth in the gravel.

refugia: An area protected from disturbance where fish or other animals can find shelter from bad weather, sudden flow surges or other short-duration disturbances.

regression (as in channel-regression equations): Equations that define the mathematical relationship among channel attributes and other variables.

return period: See *recurrence interval*.

revetment: Bank protection accomplished by armoring the bank with erosion-resistant material.

riffle: A reach of stream in which the water flow is more shallow and more rapid than the reaches above and below; natural streams often consist of a succession of pools and riffles.

rill: One of a set of well-defined, subparallel channels that vary in size according to the erodibility of the soil; generally these channels are only a few inches wide and deep.

riprap: Large, durable materials (usually rocks, sometimes broken concrete, etc.) used to protect a streambank or lake shore from erosion; also refers to the materials used for this purpose.

riparian: The area adjacent to flowing water (e.g., rivers, perennial or intermittent streams, seeps or springs) that contains elements of both aquatic and terrestrial ecosystems, which mutually influence each other.

riparian buffer: A swath of riparian vegetation along a channel bank that provides some measure of protection from the erosive forces of water along the channel margins.

riverine: Of or pertaining to rivers and river environments.

rock toe: A structure composed of rock materials, installed at the base of a bank slope to protect the base of the bank from the erosive forces of stream flow.

rootwad: The root mass of a tree.

roughness trees: Trees anchored to a channel margin or within the floodplain to increase roughness, or the resistance to flow. Their function is to slow stream flow.

S

salmonids: Members of the fish family Salmonidae. Salmonids include salmon, trout, char, whitefish and grayling.

scalp: To remove a layer of sand and gravel from a gravel bar.

scarp: A sharp break in slope, resulting from either mass failure or erosion.

scour: The process of removing material from the bed or banks of a channel through the erosive action of flowing water.

sediment: Any mineral or organic matter of any size in a stream channel.

sediment load: The sum total of sediment available for movement in a stream, whether in suspension (suspended load) or at the bottom (bedload).

sediment-transport continuity: The condition wherein the volume of material transported into and out of a reach of river is roughly equal.

shear strength: The characteristic of soil, rock and root structure that resists the sliding of one material against another.

shear stress: A measure of the erosive force acting on and parallel to the channel boundary. It is expressed as force per unit area (lb/ft^2). In a channel, shear stress is created by water flowing parallel to the boundaries of the channel; bank shear is a combined function of the flow magnitude and duration, as well as the shape of the bend and channel cross section.

sheet drain: A planar, surface-formed drain that separates the native bank material (or fill) from the surface bank treatment.

sinuosity: The ratio of stream-channel length, measured in the thalweg from the top of the valley to the bottom of the valley, or ratio of the valley slope to the channel slope. When measured accurately from aerial photos, channel sinuosity may also be used to estimate channel slope (valley slope/sinuosity).

slope: See *channel bed slope*.

spatiotemporal heterogeneity: Synonymous with habitat diversity and habitat complexity. Habitat diversity or complexity refers to the number of different types of habitats at a location. Different habitats at a location can support different life-cycle requirements for a single species, such as foraging, resting and breeding habitat. In addition, habitat diversity is also related to species richness (numbers of different kinds species) since habitats at a single location often can support different types of species.

stage: Water-surface elevation.

stage-discharge relationship: Discharge plotted against corresponding stage (water-surface elevation).

substrate: Mineral and organic material that forms the bed of a stream.

surcharge: A weight on a slope that exerts a down-slope (destabilizing) stress and a perpendicular stress component, the combination of which tends to increase resistance to sliding.

swale: A marshy depression in a stretch of land.

T

tailout: The downstream end of a pool where the bed surface gradually rises and the water depth decreases. It may vary in length, but usually occurs immediately upstream of a riffle.

terrace: A level bench breaking the continuity of a slope, usually a remnant or historic floodplain surface.

thalweg: The longitudinal line of deepest water within a stream.

toe: The base area of a streambank, usually consisting of the bottom margin of vegetated bank and that portion of bank that is submerged during low flow.

toe erosion: The erosion of particles from the streambank and/or bed which results in the undermining of the toe and subsequent gravity collapse or sliding of overlying layers.

transect: A predetermined line along which vegetation occurrence or other characteristics such as canopy density are counted for monitoring purposes. A channel cross section.

transpiration: The loss of water vapor through plant tissue.

W

watershed: An area of land surface that collects precipitation, draining it into a stream. Sometimes referred to as a drainage basin.

wattle: See *fascine*,

V

velocity: The distance that water travels in a given direction during a given interval of time.

APPENDIX D >>>
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